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UD Researcher's Computer Program Helps Decide Whether Aging Aircraft are Safe to Fly

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UD RESEARCHER'S COMPUTER PROGRAM HELPS DECIDE WHETHER AGING AIRCRAFT ARE SAFE TO FLY

DAYTON, Ohio -- Most engineers don't have much to do with statistics experts like Al Berens.

But they're starting to pay more attention as probability and statistics become the crux of computer modeling programs that help engineers decide whether it's safe to fly.

Take, for example, an engineer at an Air Force Air Logistics Center who's been warned about a new cracking problem in a 20-year-old aircraft. Should the entire fleet be grounded? Should they continue to fly? What's the risk?

After running a computer program called PROF (PRobability Of Fracture), the engineer determines that while it's safe to fly for now, inspection intervals must be stepped up to find and repair growing cracks. By inspecting these planes every 250 flight hours instead of every 1,000 hours, the program predicts, the risk of catastrophe drops from 1 in 1,000 to 1 in 10,000.

"The Air Force needs to keep airplanes flying," says Berens, a senior research statistician at the University of Dayton Research Institute (UDRI). "The model gives the engineer one more piece of information to make a decision."

Fatigue cracking can occur in the plane's "skeleton" and its outer skin. These cracks result from stresses put on the plane during takeoffs, landings and maneuvers, and the continual compressions and decompressions needed to keep the air pressure comfortable during a flight.

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Cracks commonly occur around rivet holes, doors, windows or other sharp changes in the metal.

"Every airplane does have cracks after flying a while," says Berens. "They will continue to grow in the normal use of the airplane. The bigger the crack, the less stress is needed to cause a failure."

Berens is the brains behind the PROF computer model, developed for the Air Force Wright Aeronautical Laboratories, that produces a risk analysis based on the growth, inspection and repair of fatigue cracks in aircraft being used beyond the lifetime specified at the design stage. According to Berens, an aircraft at the end of its design lifetime won't be scrapped if it's still safe, practical and economical to operate and maintain.

Making decisions that ensure safety but still keep planes flying is sometimes difficult for the Air Force as well as general aviation and commercial airlines. In the past, says Berens, the Air Force has leaned toward conservatism: inspections at frequent intervals, whether or not cracking problems have been noted.

"Conservatism is nice, but too much can get expensive," says Berens. "PROF lets engineers determine whether inspections can safely occur less often. We have to demonstrate that safety is not impaired and that (the Air Force) might save money."

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For media interviews, contact **Al Berens** at (513) 229-4475.